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EDITORIAL

Environmental chemistry is the importance of chemistry to the environment

The general definition of environmental chemistry is that it is the branch of chemical science which deals with the production, transport, reactions, effects, and fates of chemical species in the environment and the effects of human activities thereon (Stanley, 2009).

The main job of environmental chemists is to watch the changes in natural environment due to its interaction with chemicals. However, environmental chemists should be able to understand and use other sciences such as biology, geology, ecology, sedimentology, mineralogy, genetics, soil and water chemistry, mathematics and engineering (ACS, 2013).

The issue of Arabian Journal of Chemistry that is now seeing the light contains excellent papers in the field of Environmental Chemistry. Although the name of the journal is Arabian Journal of Chemistry; yet, this issue has crossed the geographical borders since 419 participants were from 23 different countries. Moreover, more than 25 articles were received after the deadline of manuscript submission (12th of July 2013). All these manuscripts were diverted to the regular issues. Table 1 shows the number of authors who published in this issue and their countries. The number of participants indicates the high standards of Arabian Journal of Chemistry. The rapid increase of its impact factor also indicates the fast progress of the journal.

The central themes of this special issue are climate, atmosphere, aquatic, hazardous waste remediation, decolorization and photocatalytic applications. Our responsibilities as chemists toward the changes in climate are explained by Shakhashiri and Bell in their article *"Climate Change and Our Responsibilities as Chemists"* (Shakhashiri and Bell, 2013). For almost all of 4.5 billion years, natural forces have shaped Earth's environment, but only during the past century and as a result of the Industrial Revolution, which has had enormous benefits for humans, the effects of human activities have become the main driver of climate change. The increase of atmospheric carbon dioxide caused by burning fossil fuels for energy to power the revolution causes an energy imbalance between incoming solar radiation and outgoing planetary emission. Such imbalance warms the planet causing the atmosphere and oceans to warm, ice to melt, sea level to rise, and weather extremes to increase. In addition, dissolution of part of the carbon dioxide in the oceans causes them to acidify, with possible negative effects on marine biota. As citizens of an interconnected global society and scientists who have the background to understand climate change, (our) main responsibility is to understand science. One available resource to help is the American Chemical Society Climate Science Toolkit, www.acs.org/climatescience. Post understanding science, our further responsibility as citizen scientists is to engage others in deliberative discussions on science as well as to take actions ourselves to adapt to and mitigate human-caused climate change, and urge others to follow our example.

The review article of Kanchi, Singh and Bisetty *"Dithiocarbamates as hazardous remediation agent: A critical review on progress in environmental chemistry for inorganic species studies of 20th century"* is categorized under the topic "Hazardous Waste Remediation" (Kanchi et al., 2013). This review paper mainly focuses on the synthesis of various dithiocarbamates and its applications as a Hazardous remediation agent. Dithiocarbamates (DTCs), a group of small organic molecules with a wide range of applications, such as (i) pesticide and fungicide in agricultural sectors (ii) anti-oxidant (iii) exhibiting strong chelating ability toward inorganic species due to the presence of free thiol groups in the DTCs, it acts as a hazardous remediation agent superior to other ligands. The article of Sheng et al. (2013) has also a relationship with 'Hazardous waste remediation'. Hazardous heavy metal pollution of water is an increasingly urgent problem all over the world. Removal of heavy metals is normally achieved by precipitation, sedimentation, and filtration. One effective way of removing heavy materials is adsorption on various materials such as activated carbon, biomaterials and clay minerals. Recently, there has been an increasing interest in clay minerals as adsorbents by virtue of their layer structure and properties. In this paper, we prepared glutamate intercalated Mg–Al LDH and used it as an absorbent to remove Pb^{2+} from aqueous solutions. The results showed that glutamate intercalated Mg–Al LDH has good potentialities for cost-effective removal of Pb^{2+} from

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Table 1 List of countries which contributed to the special issue.

Country	Number of manuscripts	Number of participants
Algeria	1	3
Australia	1	5
Brazil	1	1
Brunei Darussalam	3	16
China	5	19
Czech Republic	1	5
Egypt	9	31
India	41	119
Iran (Islamic Republic of)	15	40
Iraq	11	19
Italy	2	14
Jordan	1	3
Malaysia	6	27
Morocco	1	7
Pakistan	8	41
Saudi Arabia	7	22
Serbia	1	1
South Africa	4	16
Taiwan	1	3
Thailand	1	2
Tunisia	5	16
Turkey	3	7
United States	1	2
Grand total	129	419

wastewaters. Sfaksi et al. (2013) article also dealt with 'Hazardous waste remediation'. He reported that using cork powder waste which has no economic interest and which causes important atmospheric pollution because of its low weight and high volatility can help in Cr(VI) removal from water. The choice of this method of water treatment was done on the basis that in the region where the study was conducted, there are two types of pollution. The first one and the most important is water contamination by tannery wastewater extremely charged with Cr (VI). The second is an atmospheric one caused by cork by-product which is the most important industries in the region.

Trakal et al. (2013) reported that dissolved form of metals, originated from industrial processes or from agriculture, should be removed from the aqueous solution using different kinds of sorbents. This material which is newly utilized is biochar (pyrolyzed organic carbon) which is produced as a charred material by thermal decomposition of some waste product brewers draff under conditions of minimal oxygen presence. As a modern approach, such prepared biochar was tested for its efficiency to remove Cu from the simulated Cu-contaminated solution and was also activated to enhance its sorption efficiency. *Ni/Silica catalyzed acetylation of phenol and naphthols: An eco-friendly approach* is reported by Alam et al. (2013). Acetylation reaction is well known for organic chemistry. Acyl group plays an important role in the chemistry of biomolecules during this reaction generally used lewis acid homogeneous catalyst like, volatile solvent and other chemicals. Ni/SiO_2 heterogeneous catalyst was used for the acetylation of phenol and naphthols. Heterogeneous catalyst is better than homogeneous catalyst due to recovery of catalyst, economic and reusability, no hazardous chemical as by product. Al-Homaidan et al. (2013), claimed that, removal of heavy metals from polluted waters by micro- and macro-algae is a cheap, practical, quick and eco-friendly process. In this concept, different concentrations of the dry biomass of the micro-alga (cyanobacterium) *Spirulina platensis* were used to remove copper ions from aqueous solutions under different conditions. These include pH, concentration of the metal, temperature and contact time. The highest level of biosorption (90.6%) was approached in a solution containing 0.050 g of dry biomass. The maximum conditions for removal were: pH 7, 100 mg of copper/L, 37 °C and 90 min of contact time. He recommends the use of this technology for hazardous waste remediation.

Mouslim Messali (2013) in his article, *'An efficient and green sonochemical synthesis of some new eco-friendly functionalized ionic liquids'*, explained that a considerable stress to replace a lot of volatile organic compounds (VOCs) which were used as solvents in synthetic organic chemistry has been done for many chemical industries. The use of ionic liquids (ILs) as a novel class of environmentally friendly solvents is now of topical interest among the chemical community, worried about the environmental impact of VOCs. On the other hand, the use of a facile and green ultrasound-assisted procedure as an environmentally friendly alternative to traditional methods for the preparation of new ionic liquids (ILs) showed a clear yield increase and a dramatic reduction of the reaction time.

Rashad et al. (2013) reported that heterogeneous photocatalysis using semiconductor has been found to be highly effective for environmental application. In this contribution, ZnO doped SnO_2 (Is this right?) has been successfully synthesized. The prepared photocatalysts were tested by the determination of photocatalytic degradation of methylene blue (MB). The results indicated that Zn^{2+} doping at 0.3 ZnO: 0.7 SnO_2 molar ratio showed the highest MB photodegradation. The ZnO/SnO_2 photocatalysts were quite stable since no decrease in activity in the first four cycles was observed. Design of catalyst material should also be useful in photocatalysis, with the capability of destruction of pollutants and carrying out selective catalytic processes. Microwave-assisted photocatalytic degradation of dyes is one of the emerging technologies for waste water remediation. Microwave effectively accelerates photocatalytic degradation, when microwave electrodeless lamp (MEL) substitutes traditional UV lamp as light source. This setup can be extremely simplified if MEL and photocatalyst can be replaced by a catalyst which can work under microwave irradiation in the absence of any light source. The work is reporting for the first time degradation of acid orange 7 (AO) under microwave irradiation using polyaniline (PANI) as catalyst in the absence of any UV lamp as light source (Riaz et al., 2013). The degradation/decolorization was carried out in neutral acidic and basic media and was monitored spectrophotometrically to evaluate the ability of microwave irradiation to degrade AO. Microwave irradiation showed excellent performance as it completely decolorizes AO dye solution in 10 min. With the advantages of low cost and rapid processing, this novel catalyst is expected to gain promising application in the treatment of various dyestuff wastewaters on a large scale.

Hassan and Bahrani (2013), determined atorvastatin in human serum by salting out assisted solvent extraction and reversed-phase high-performance liquid chromatography–UV detection. Their procedure afforded a convenient, selective, fast and cost-saving operation with good cleanup ability for

the model analyte. The method involved a simple one-step solvent extraction of atorvastatin from serum followed by salting out the organic solvent using magnesium chloride.

Mahmood and Malik (2013), in their article Human health risk assessment of heavy metals via consumption of contaminated vegetables collected from different irrigation sources in Lahore, Pakistan highlight the heavy metal pollution level and sources in wastewater, unfair irrigation practice and its hazardous impact on human health via food chain. They concluded that long-term use of wastewater as irrigation purpose may lead to the severe risk to consumer's health as; this study has already shown a severe risk to human health by two vegetables. They suggested that urgent attention is required for implementation of proper means to monitor and regulate the industrial and municipal effluents.

Salman (2013), in his article entitled, *optimization of preparation conditions for activated carbon from palm oil fronds using response surface methodology on removal of pesticides from aqueous solution,* reported that activated carbon is the most widely used adsorbent material for adsorption due to its efficiency and economic feasibility. Utilization of activated carbon can be in the form of powder, granular and fiber or cloth. Its primary role in this context is to adsorb dissolved organic impurities and to eliminate substances affecting odor, taste and color in halogenated hydrocarbons and other organic pollutants. Adsorption on activated carbon is the most widely used technology to deal with purification of water contaminated by pesticides, dye, phenol compounds and other hazardous chemicals. Utilization of cheap and abundant raw materials in the production of activated carbon will minimize the cost of its production and will as well reduce solid waste pollution. It is noteworthy to say that the selection of these cheap raw materials coupled with the proper production and application methods will both improve the efficiency of contaminant removal and reduce the cost of production of activated carbons. Therefore, it is of extreme relevance to find suitable low cost precursors that are economically attractive and at the same time able to produce activated carbons with high adsorption performance. In another study about using activated carbon, Saad et al. (2013), *in their article, Adsorption of anthracene using activated carbon and Posidonia oceanica, concluded that, marine waste, posidonia oceanica*, as a sustainable natural resource and eco-friendly material due to its large use as raw materials for many applications such as waste water treatment is reported. *Posidonia oceanica* can be used as precursor material for the preparation of activated carbon. The preparation of activated carbon from *Posidonia oceanica* is economically promising twofold as the non-wood forest product waste would be utilized and also the production of activated carbon for the treatment of wastewaters. The present study offers an alternative usage of *Posidonia oceanica* accumulated on the beach in the industry. Dynamic adsorption of DMMP (dimethyl methylphosphonate) [$CH_3PO(OCH_3)_2$] over synthetic zeolite-Alpha was found to be high initially and it then decreases with increase in injected volume (Khanday et al., 2013). It was found that adsorption increases with increase in contact time between DMMP and zeolite-Alpha only up to 8 h after which it remains almost constant. Desorption pattern was analyzed which shows two types of peaks, sharp peak with onset temperature of around 30 °C which represents desorption of physisorbed DMMP and a broad peak with the onset temperature of around 110 °C which represents the desorption. Kamboh et al. (2013), demonstrated the adsorption of direct black-38 (DB-38) azo dye on a potential and newly synthesized *p-tert*-butylcalix[6]arene based silica resin **4**. The resin **4** was synthesized via immobilization of *p-tert*-butylcalix[6]arene (**3**) onto modified silica **2**. The resin **4** was characterized by using different analytical techniques such as FT-IR, scanning electron microscopy (SEM) and thermo gravimetric analysis (TGA). The effect of adsorbent dosage, pH and electrolyte effect on the removal of DB-38 azo dye was evaluated through the batch wise adsorption experiments. Maximum adsorption of 91% was achieved at pH 9.0. The textile wastewater samples were used to ensure the field applicability of the newly synthesized adsorbent **4** for the treatment of dye contaminated effluents. All the results regarding to the removal of DB-38 azo dye from the aqueous environment prop up resin **4** as an effective adsorbent were analyzed and it was found that the resin **4** has high adsorption efficiency toward DB-38 azo dye at a wide range of pH as compared to **1** and **2**.

Nurchi et al. (2013), in their article, *sorption of chrysoidine by row cork and cork entrapped in calcium alginate beads* examined the ability of cork residues in the removal of chrysoidine, a representative azo-dye, from waste-water. Dyes released into aquatic environment by textile, leather, plastic, and food industries are nowadays of crucial concern due to their toxic, mutagenic and carcinogenic characteristics. Water-soluble azo-dyes are greatly resistant to biodegradation, being characterized by a high thermal and photo stability due to their complex structures. Sorption has been demonstrated as an effective method for the remediation of aquatic systems by removing such hazardous wastes. They concluded that this kind of treatment allows furthermore solving an ecological task, being a low cost process and the sorbent biodegradable.

Rahman et al. (2013), in their review, *Production of slow release crystal fertilizer from wastewaters through struvite crystallization*, reported that, wastewaters contain high amount of organic matter, heavy metals, nitrogen and phosphorus that directly affect the water bodies, aquatic animals, soil and air. Phosphorus and nitrogen enhance the algal growth that reduces the light penetration and available oxygen in the water bodies. Production of struvite from wastewaters and its utilization as fertilizer provides benefit in several ways; (i) reduction of hazard eutrophication in the water bodies by removing nitrogen and phosphorus (ii) 1/3 emission of N_2O as compared to urea due to slow releasing nature and thus it can help to minimize the global warming.

Due to the important biological activity of Schiff bases containing pyrimidine units, several novel oxopyrimidines and thioxopyrimidines derivatives have been synthesized by Tomma et al. (2013). A biological evaluation of various substituted pyrimidine derivatives revealed interesting antibacterial, antifungal, antiviral, anti-inflammatory, antidegenerative, antiaggregating, and hypoglycemic and local anesthetic properties. Structure–activity relationship analysis suggests that the synthesis of these derivatives can be enhancing such activities in turn improving our environment. Sobral-Souza et al. (2013), in their study, *Cytoprotective effect against mercury chloride and Bioinsecticidal activity of Eugenia jambolana lam.*, concluded that the essential oil of *Eugenia jambolana* Lam. is an important alternative in the search for bioinsecticides, since it showed positive results at relevant concentrations against *Drosophila melanogaster* as the target arthropod. On the basis

of the results, it is evident that the extract not only has an allelopathic effect on lettuce seeds, but also its interaction with mercury chloride provides better growth of radicles and plumules of *Lactuta sativa*, showing that *E. jambolana* can be an alternative solution to the problem of contamination by heavy metals, besides showing cytoprotective potential and moderate chelating activity.

Final words from the Guest Editor

The guest editor wishes to thank all the authors of the submitted manuscripts without whom, this special issue would not have been possible. He also thanks the anonymous reviewers who exerted their time and effort to provide a thorough evaluation of the submitted manuscripts in a timely manner. And last but not least, the editor would also like to thank the staff of Arabian Journal of Chemistry for their appreciative help. A special thank-you goes to Prof. Dr. Abdul Rahman Alwarthan for inviting me as editor and Mr. Zaheer for his full cooperation during the preparation of this special issue. Thanks also to Dr. Hythm for his assistance.

Till now there are 54 articles with final disposition, however, only 20 articles will appear in this issue according to the publisher regulation. As we promised in our first announcement, the rest of articles will appear in the next issues.

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